The Management of Silver Gulls Larus novaehollandiae on the Shoalwater Bay Islands.

1. Introduction

Close to urban and agricultural settlement, at higher latitudes in both the northern and southern hemishperes, gull numbers have been increasing for several decades. A number of species-populations are known to be expanding at between 11 and 13 percent per annum (eg. Duncan 1978, Blokpoel & Tessier 1986). This spectacular population growth is generally attributed to an increasing availability of gull food in the form of human organic waste, including domestic waste, food scraps, fishery & abbattoir waste and sewerage.

The Australian Silver Gull is no exception, for its populations have also increased dramatically near the closely settled parts of the country. The colonies near the Perth metropolitan area, at Rottnest I., Carnac I. and in Shoalwater Bay, have been growing rapidly over the last two decades. From 1940 to 1942 there were apparently no Silver Gulls nesting Penguin Island or Seal Island. There were small colonies on Shag and Bird Islands and on the rocks in Warnbro Sound, but the overall breeding population was probably no more than 200 pairs. Gulls were breeding on Seal Island in the 1960's and had probably started nesting on Penguin Island by this time. At present an estimated 2,500 to 3,000 pairs nest on Penguin Island alone with at least 4,000 pairs in Shoalwater Bay (Dunlop et al.

in press).

The problems associated with large gull populations are manyfold. Of primary concern in this report is their impact, and potential impact, on the Island conservation reserves. Small gulls such as the Silver Gull can significantly reduce the breeding success of other nesting species, including the various terns and cormorants, by the direct predation of eggs or young and by stealing food intended for chicks (kleptoparasitism). Both activities are facilitated by human disturbance of tern or cormorant colonies. However unlike the large gulls, Silver Gulls are not predators of other adult seabirds such as Storm-petrels.

Indirectly gulls can markedly change the breeding habitat by trampling and 'burning off' the vegetation and increasing soil nitrogen levels. They frequently introduce the propagules of weeds from their mainland foraging areas, and because these are typically winter annuals which grow profusely on nitrogenous soil, open areas of the colony quickly become overgrown. This makes some traditional tern colony areas unhabitable by breeding birds for all, or part, of their breeding season (Thomas 1972, Morris et al. 1980).

Away from their breeding colonies gulls are often a pest species, stealing food from people, fouling public places, damaging private property (particularly boats) and crops. They are frequently infected with human enteric

bacteria, including Salmonella, which they can transmit to the public directly through contact with the feaces, or indirectly, by infecting water bodies or the water supply. Gulls feeding, or roosting, near airports are often a major airstrike hazard and it is in this context that they have been most frequently subject to control measures (Blockpoel & Tessier 1986).

The colonies on the Shoalwater Bay Islands may require control because;

1) they probably reduce breeding success in Crested and Caspian Terns (possibly in Bridled Terns) and in Pied Cormorants nesting on the Islands,

2) they are causing vegetation change in some plateaux colony areas,

3) they may impede rehabilitation in dunal colony areas,

4) aggressive birds near the walkways on Penguin Island are a potential public hazard,

5) of heavy fouling of some amenities on Penguin Island,

6) the build up in the local population is increasing gull problems in the Rockingham area.

2. Relevant Biological Considerations

a) Feeding ecology

The natural feeding niche of the Silver Gull is almost

certainly as a scavenger, in the intertidal zone and on the tideline. The breeding chronology of the metropolitan gull population may well be tied to the onset of the winter high tides (in early April) and the westerly storms (usually beginning in May) which strand seaweed high on the strand. The detrital consumers of this dead plant matter, Amphipods and Kelp-fly larvae, are apparently the only significant natural food.

As scavengers, Silver Gulls have rapidly taken to exploiting human food waste materials and today most breeding gulls rely on such sources. Carrick & Murray (1964) suggested that gull populations were limited by intra-specific competition, at feeding areas, within foraging range of the breeding sites. Coastal sanitary landfill sites, in particular, probably influence the growth and ultimate size of gull populations nesting on nearby offshore islands. However access to food scraps at landfills is concentrated at the working tip front and could be controlled at this point.

b) Breeding seasonality

The Silver Gulls nesting on the metropolitan islands have the longest breeding season known in gulls, with laying usually extending from late March until mid-November. During this period many pairs will make a number of breeding attempts, commonly 3 or 4, and some pairs can successfully rear progeny from two broods (Wooller & Dunlop 1979). The number of participating pairs is at its maximum

in autumn (April & May) with some pairs 'dropping out' later in the season. A basic moult, which is completed in about 100 days, occupies the non-breeding period between October and March.

c) Proximate control of reproduction

Both light (photoperiod) and temperature have been implicated in the proximate control of the breeding cycle (Dunlop 1987). Increasing daylength and temperature, in September and October, apparently inhibit spermatogenesis and follicular development in breeding birds and stimulate the moult. Gonadal recrudescence ensues after a fixed period of regression and recovery. Proximate factors are probably not involved in the resumption of reproductive activity.

d) Laying and natality

Between 60 and 75 percent of Silver Gull clutches consist of two eggs, the remainder being ones or threes, the ratio depending on the quality of the season (Wooller and Dunlop 1979 & 1981). Hatching success is generally around 60%, but may be as low as 20% when the predatory skink Egernia kingii is abundant and active (unpubl. data). Fledging success has not been adequately estimated but is evidently low in most breeding pairs. A few pairs however do fledge the progeny from two broods in a single season (Nicholls 1974).

Replacement clutches can be produced within 12-14 days of failed breeding attempts, regardless of the stage at

which the progeny were lost. Usually about half of clutches lost are replaced within three weeks, and up to 88% of breeding pairs that fail will re-lay, at some stage, later in the season (Wooller & Dunlop 1979).

e) Mortality and recruitment

The banding-recovery data shows that mortality, in the first year or so of life, is high. Once breeding, the annual survivorship of our Silver Gulls is estimated at between 0.8 and 0.9 giving a mean expectation of breeding life of 8-10 years (unpubl. data). There are many examples of gulls banded by C.A. Nicholls on Carnac Island in 1972/73 attaining longevities of at least 12-19 years. It is clear that the population increase in Silver Gulls stems from the output achieved through the long breeding-life of the adult birds rather than from high breeding success or post-fledging survival.

Banding has indicated that recruits are exchanged between the metropolitan colonies at Rottnest I, Carnac I. and Shoalwater Bay. These colonies thus make up a larger breeding population. Silver Gulls are sexually mature at two years of age but probably do not begin breeding until their third or fourth year. Once breeding successfully Silver Gulls retain their specific nest sites. Established colony areas are very stable but totally new colonies are sometimes deserted if breeding persistently fails.

3.1 Gull Control - The Options

Gull control programmes fall into two broad categories depending on their scale and objectives; population control and local control (Blokpoel and Tessier 1986).

Population control aims at an effective reduction in the number of breeding gulls, within all colonies which exchange recruits. This should result in an overall reduction in gull problems in a prescribed region. A variety of approaches have been used including egg removal or breaking, egg removal and nest raking, egg spraying (with formalin and emulsion), feeding of adults with sterilants, narcotic poisoning of adults, scaring prior to breeding, habitat alteration or destruction and the introduction of sterile predators (Thomas 1972, Duncan 1978, Morris et al. 1980, Blokpoel 1983, Blokpoel & Tessier 1986). Programmes based on reducing natality (ie. egg removal, egg spraying ect.) are generally ineffective because many clutches are not found, eggs are replaced and nest mortality is generally high anyway.

Approaches which increase adult mortality (ie. culling programmes) are more effective although it may still take several years to bring about a decline in breeding numbers. The initial trend is often for accelerated recruitment, with an attendent decline in the age of first breeding and a change in colony age structure (Duncan 1978). Breeding success may increase or decrease when a colony is culled. The pattern of culling may greatly influence its efficacy. Uniform reduction in nesting density throughout the colony

may increase its attractiveness to site-seeking gulls, leading to accelerated recruitment. The complete clearance of breeding pairs from intensively culled sub-areas may lead to relatively little recruitment (Burger & Shisler 1980).

On nature reserves strategies such as habitat alteration, or the introduction of predators, are generally not acceptable, because they will also affect non-target species.

Population control is a highly intensive process, involving many man-hours a season over a period of years. As long as artificial food sources remain accessible, close to the colonies, population control would be an ongoing process.

Gull population control would not be a viable management activity for the Shoalwater Bay Islands. Any reduction in breeding adults, or in output, at these colonies would be at least be counter balanced by recruitment from the ones not subject to control measures. Management is thus left with programmes aimed at 'local control'.

The objectives of local control is to reduce the impact of gulls on selected areas either on the nesting islands or at feeding, drinking or loafing sites. Local control may also serve to prevent management problems arising due to the activities of gulls. However in local control it is fully accepted that, at best, the gulls may

move to a less sensitive area or, at worst, the problem will re-emerge at another locality.

On the Shoalwater Bay Islands there is already a case for removing or excluding gulls from small areas where they 1) are involved in the kleptoparasitism of terns or the predation of their eggs 2) are causing undesirable changes in the vegetation cover or 3) are a hazard or unacceptable nuisance to members of the general public. There is also a requirement to impede future expansion of the colony on Penguin Island, by taking measures both on the Island and at the Rockingham sanitary landfill site.

The measures available for local control on the Shoalwater Bay Islands include;

a) intensive small area, or selected individual, culling

b) the creation of a recruitment sink

c) wire or monofilament banks.

3.2 Gull Control for the Shoalwater Bay Islands

The following control measures are recommended on the Shoalwater Bay Islands to;

a) reduce the number of gulls in problem areas and

b) to impede the physical expansion of the gull colonies.

<u>Intensive small area and individual culling</u>

The only effective way of removing breeding gulls from nesting habitat (without excluding other species) is by culling the adults. Baits containing 200mg of the narcotic alpha-chloralose are sufficient to induce comatosis and death through hypothermia within about two hours, in the

largest of Silver Gulls. Because the birds are narcotized, death is not traumatic and there is little panic by the affected individuals. Gulls receiving insufficient dosages will recover with no long-term ill-effects.

In order to maximise the effectiveness of the cull the baits should be laid on the nests (preferrably those with eggs) in the late afternoon, when both members of each breeding pair are likely to be present. If two baits are laid on each nest it is often possible to take both birds. Each nest should be clearly marked to facilitate recovery of the carcasses and of any baits left untaken. By baiting only in late afternoon, or at dusk, diurnal foraging, non-target species such as the skink Egernia kingii can be avoided. Seabirds, other than gulls, will not feed on land and are not at risk.

The kleptoparisitism, and egg predation, of Crested Terns is usually done by a few, experienced gulls with nests in the immediate vicinity. It is a learned pattern of behaviour which is better developed in gull colonies where the terns are frequently disturbed by people, leading to more opportunities. By observation, known kleptoparasites or egg stealers can be traced to their nest sites and baited. This should be done around the Crested Tern colony on Seal Island, probably in every second season (September - October).

In areas where significant vegetation degeneration is occurring, or competition with terns is taking place, or

likely to take place, gulls should be culled from specific areas. Such culling should be concentrated, to quickly remove almost all nesting gulls and prevent the treated area becoming attractive to recruits. Considerable vegetation degeneration is occurring on parts of the northern plateau of Penguin Island. The situation should be monitored, and specific area culling carried out, if the current trend continues. The impact of high gull densities on the breeding success of Bridled Terns should also be monitored with the view of specific area culling as required.

New nesting areas outside the limits of the existing colonies should be culled and all breeding pairs eradicated. Such areas become the nuclei for extra-limital colony expansion and once established can lead to accelerated growth in the breeding population. A number of breeding pairs now nest on the tombolo and these gulls will ultimately attract others. As the tombolo is rehabilitated, and public access is reduced, it will become increasingly suitable as gull breeding habitat. All breeding pairs with nests on the tombolo (currently 8-10) should be culled to prevent the colony expanding further into this area. Parts of the central dunes might also be culled to slow colony expansion.

The creation of a recruitment sink

Another way of preventing colony expansion and further increments in population, is to use culling to create a

recruitment sink. Breeding gulls could be removed progressively from a defined, high density area at the colony 'centre'. The object is to create an area of reduced density in the most attractive part of the colony and to continually absorb recruits, which might otherwise occupy new areas or start new colonies. A potential area on the northern plateau of Penguin Island is shown on Figure 1. As a simulation, many of the gulls to be collected in a current research project will be taken from this area.

Wire or monofilament banks

Horizontal banks of wires or monofilament lines, strung above ground and under tension, have been used in a number of contexts to exclude gulls from problem areas (Blokpoel 1983, Blokpoel & Tessier 1984). It appears to be important for the wires to be difficult for the gulls to see, creating uncertainty and anxiety about landing and escape. Actual injury to the birds is uncommon. There are at least three applications in the Shoalwater Bay area;

1) the exclusion of nesting gulls from local areas within the colonies
2) the exclusion of nesting gulls from the edge of the walkways
3) the exclusion of gulls from the tip-face at the Rockingham (Baldivis) sanitary landfill site.

In the colony areas low banks of monofilament lines could be used to exclude nesting gulls where there is no

concurrent conflict with other breeding seabirds. The lines should be about 1.5m above the ground and spaced about 1.0m apart. An extra line at 0.5m should be strung on the periphery. Star pickets would make ideal uprights.

A similar configuration would serve to keep agressive gulls away from the walkways. In this situation the lines could be tensioned between the walkway railings and a row of star pickets 10-15m into the colony.

Much of the food waste taken by gulls at sanitary land-fill sites becomes available at the tipping front whilst the rubbish is being pushed or buried by the bulldozer. Wire banks positioned over the tipping front but allowing access to trucks and earthmoving machinery, should significantly reduce the foraging opportunities to gulls. Such banks would need to be demountable such that they could be moved with the tipping front(s). C.A.L.M. should actively encourage the Rockingham Town Council to install and operate such as sytem from the first day of operation of the new Baldivis Tip-site. It will be much easier to prevent gulls from visiting the tip at the outset than to exclude them once a new foraging pattern has been entrained.

3.3 Public Relations

The excercise of any control programme is likely to attract some adverse opinion from a few community groups, especially if any form of culling is involved. Whilst the arguments for selective, limited control of gulls may be

very powerful, no programme will be operable if there is widespread public dissention.

The authority charged with managing wildlife and nature reserves has two broad options;

1) whilst fulfilling all provisions of the wildlife act in relation to taking protected fauna, conduct the control programme in a way which minimises public interaction and involvement or

2) conduct an extensive public information campaign which clearly sets out the need for the control measures, the rationale behind the measures selected, the impact of the control measures, the ethical/animal welfare considerations of the action, the short and long term control strategies and the cost.

With present attitudes towards public involvement in environmental management, the second option is probably more acceptable and has been adopted already, to some extent, in Tasmania and Queensland. Such a campaign should begin a full 12 months before any operational control measures take effect and should provide an opportunity for public debate and comment.

REFERENCES

Burger, J. and J. Shisler (1980). The process of colony formation among Herring Gulls Larus argentatus nesting in New Jersey. Ibis 122, 15-26.

Blokpoel, H. (1983). Gull problems in Ontario. Canadian Wildl. Service, Ottawa, Ontario, Information Leaflet, 9pp.

Blokpoel, H. and G.D. Tessier (1984). Overhead wires and monofilament lines exclude Ring-billed Gull from public places. Wildl. Soc. Bull. 12, 55-58.

Blokpoel, H. and G.D. Tessier (1986). The Ring-billed Gull in Ontario; a review of a new problem species. Occassional Paper No. 57 Canadian Wildlife Service, 34 pages.

Carrick, R. and M.D. Murray (1964). Social factors in population regulation of the Silver Gull Larus novaehollandiae Stephens. CSIRO Wildl. Res. 9, 189-199.

Duncan, N. (1978). The effects of culling Herring Gulls (Larus argentatus) on recruitment and population dynamics. J. Applied. Ecology 15, 697-713.

Dunlop, J.N. (1987). The comparative breeding biology of sympatric Crested Terns Sterna bergii (Lichtenstein) and Silver Gulls Larus novaehollandiae (Stephens) in south-western Australia. Unpublished Ph.D. Thesis (Murdoch University: Perth).

Dunlop, J.N., N.I.Klomp & R.D. Wooller. in press. Penguin Island, Shoalwater Bay, Western Australia. Corella Seabird Island Series.

Morris, R.D., Kirkham, I.R. and J.W. Chardine (1980). Management of a declining Common Tern colony. J. Wildl. Manage. 44, 241-245.

Nicholls, C.A. (1974). Double-brooding in a Western Australian population of the Silver Gull Larus novaehollandiae Stephens. Aust. J. Zool. 22, 63-70.

Thomas, G.J. (1972). A review of gull damage and management methods on Nature Reserves. Biological Conservation 4, 117-27.

Wooller, R.D. and J.N. Dunlop (1979). Multiple laying by the Silver Gull, Larus novaehollandiae Stephens on Carnac Island, Western Australia. Aust. Wildl. Res. 6, 325-35.

Wooller, R.D. and J.N. Dunlop (1981). Annual variation in the clutch and egg sizes of Silver Gulls Larus novaehollandiae. Aust. Wildl. Res. 8, 431-433.